REMARKS

Claim 1 is amended to recite that the width (B) of the cooling gas stream at the exit is not more than 2 mm, with support found at least at original claim 7. Claim 4 is amended to recite that the cooling gas stream has a Reynolds (Re) of at least 2,500 based on its width (B), measured substantially in the direction of passage of the continuously molded bodies through the air gap, and on its velocity in the direction of flow, and the viscosity (v) of the cooling flow medium, and that the extrusion orifices have a temperature of up to 102°C. Support for the amendment is found at least at original claim 22, page 7, first full paragraph and Table 1. Claim 12 is amended to clarify that the cooling gas stream is separated in a cooling area, and claims 13 and 14 are amended for consistent antecedent basis with amended claim 12. Claims 2, 22, 23 and 27 are canceled. Applicants respectfully submit that the Amendment does not add new matter. With entry of this Amendment, claims 1, 3-21 and 24-26 are pending.

Examiner Interview

An interview was held between Examiner Leyson and the undersigned on April 3, 2009. Applicants wish to thank the Examiner for his time and attention in considering Applicant's arguments. Applicant's representative set forth reasons why each independent claim was patentable over the cited references, and additional patentable features were discussed. The Examiner indicated he would to give careful consideration to Applicant's arguments in the response.

Claim Objections

Claim 23 is objected to under 37 C.F.R. 1.75(c) as being in improper dependent form. To further advance prosecution, and without acquiescing that the objection has merit, claim 23 is canceled.

Claim Rejections Under 35 U.S.C. § 103

Claims 1 and 3-26 stand variously rejected as being obvious under 35 U.S.C. § 103(a) over a combination of references. These rejections are respectfully traversed, as set forth below.

Claims 1, 3-10, 12-14 and 21-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over International Publication No. WO96/21758 to Courtaulds Fibres Holdings (WO '758) in view of U.S. Patent No. 6,117,379 to Haynes et al. ("Haynes").

Claims 11, 15, 16, 18, 25 and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 96/21758 in view of Haynes and further in view of U.S. Patent No. 5,639,484 to White et al. ("White").

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 96/21758, in view of Haynes, and further in view of U.S. Patent No. 3,932,576 to Patel.

Claims 19 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 96/21758, in view of Haynes, and further in view of U.S. Patent No. 4,033,742 to Nichols et al. ("Nichols").

Independent Claims 1 and 4

The combined disclosure of WO '768 and Haynes fails to teach or suggest each element of amended independent claims 1 and 4. Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness.

First, WO '768 does not teach a velocity of cooling gas stream in the direction of flow, according to amended claims 1 and 4. WO '768 depicts in the figure a cooling gas stream transverse to the direction of travel of the extruded dope and indicates at page 3, lines 2-8 that "[a]ir is . . . supplied to and extracted from the air gap in a direction substantially transverse to the direction of travel of the dope extrudate . . . as a cross-draft." Applicants respectfully submit that the Office action is incorrect in suggesting that "if the cooling gas stream is not totally transverse . . .[it] would have a velocity component oriented into the direction of passage." The Examiner appears to use hindsight provided by Applicants' invention, because WO '768 contains no teaching or suggestion to orient the cooling gas stream in the direction of passage. Applicants note that the air both supplied to and extracted from the air gap of WO '768 is described as being substantially transverse, and that "not totally transverse" would include flow against the direction of passage, as well as in the direction of passage. More importantly, however, WO '768 is explicit in showing and describing only a "transverse arrangement" flow of air, described as a "cross-draft," and contains no teaching or suggestion to orient the flow in the direction of passage. Haynes fails to cure the deficiencies of WO '768 because it also does not

teach or suggest orienting flow in the direction of passage. Indeed, in Figure 3, Haynes shows that the flow is oriented against the direction of passage. Accordingly, combining the teachings of Haynes and WO '768, one of skill in the art, would, at most, be motivated to orient the flow transverse to or against the direction of passage.

Second, WO' 768 does not teach or suggest, as the Examiner has acknowledged, the use of turbulence to cool the extruded fibers at all, let alone that the cooling gas stream exits in a turbulent flow state from the blowing means, as required by amended claims 1 and 4.

Instead, the Examiner asserts that Haynes discloses "placing a bar arrangement at an exit to the blowing means …to increase the turbulence at the exit…." Office action, page 10, lines 14-16.

However, amended claims 1 and 4 each make clear that the cooling gas stream is already turbulent right at the exit from the blowing means, i.e., that the cooling gas stream exits in a turbulent flow state from the blowing means. In contrast, as Applicants have previously indicated, Haynes's cooling gas stream exits in a "substantially laminar flow…from a source toward the bars." (col. 5, lines 47-48). The cooling gas stream is transformed to a turbulent flow state only after passing a "turbulence-inducing bar arrangement" (col. 5, lines 14-15), i.e., long after exiting from the blowing means. Moreover, Haynes's cooling gas stream does not arrive at the bar arrangement in a turbulent state, rather turbulence is <u>generated</u> by the bar arrangement. For example, Haynes discloses "the bar arrangement <u>causes</u> turbulence without requiring increased flow velocity, thereby minimizing disturbance or breakage of the filaments being quenched," (col. 2, lines 17-19) (emphasis added), and "[t]he sizing and spacing of bars 12 should be such that the quenching gas <u>is converted to turbulent flow</u> having a turbulence intensity greater than about 5%..." (col. 5, lines 41-43) (emphasis added). Furthermore, the expression "conventional velocity" according to Haynes indicates that the cooling gas stream exits in a laminar flow state, which is also indicated by the maximum stream velocity of 2.5 meters per second (500 feet per minute). Thus the teachings of Haynes are limited to creating turbulence in a laminar cooling gas stream having low conventional velocity. This velocity is insufficient to make the cooling gas stream turbulent without the use of Haynes's bar arrangement. Haynes does not contain any suggestion of a cooling gas stream exiting a blowing means at a turbulent state without the use of additional means such as screens or bar arrangements. Rather, it requires inadmissible hindsight and knowledge of the claimed invention

to construe the description in column 5, lines 12 to 15 of the use of conventional apparatus to distribute the air as a disclosure of an initially turbulent stream.

Third, with respect to claim 1, the combined teachings of WO 96/21758 and Haynes are further deficient. Claim 1 requires that "the cooling gas stream has a Reynolds number (Re) of at least 2,500" and that "the width of the cooling gas stream at the exit is not more than 2 mm."

WO '758 and Haynes, taken separately or combined, fail to teach or suggest a cooling gas stream having a Reynolds number of at least 2,500, or a width of not more than 2 mm of the cooling gas stream at the exit, let alone the combination of these features.

A cooling gas stream with such a low width occupies only a small area of the air gap. Therefore it interacts with a small section of the extruded bodies. One of ordinary skill in the art would reasonably expect that such a thin cooling gas stream would inadequately cool the extruded bodies. However, the inventors discovered that the extruded bodies are cooled down sufficiently, as the combination of this cooling gas stream with the high Reynolds' number of at least 2500 results in a cooling gas stream in a turbulent flow state. Due to the turbulent flow state, the gas stream circulates around the extruded bodies and absorbs the heat from the extruded bodies efficiently. Moreover, inventors surprisingly found that due to the turbulent nature of the cooling gas stream, even bodies averted from the exit of the cooling gas stream are cooled sufficiently. As noted in Applicants specification:

> "one would have expected in the case of a blowing process performed with a turbulent cooling gas stream at a high velocity that due to the high velocities the spun filaments would be blown off and would thus stick together. Surprisingly, however, it has been found that the spun filaments are not impaired, but quite to the contrary the gas demand can be reduced drastically when small turbulent gas streams are used, and the risk of sticking is very small."
>
> Page 6, last paragraph.

Neither reference, taken alone or in combination with each other, teaches or suggests these advantages, such that a *prima facie* case of obviousness has not been established for claim 1.

Fourth, with respect to claim 4, neither reference teaches or suggests the velocity of the cooling gas stream of 30 m/s recited in claim 4. Rather, Haynes discloses "[t]he flow velocity of quenching gas or air from the supply zones 140-143 should be conventional. Generally, the flow

velocity of supply gas should range from about 50-500 feet per minute…" (col. 7, lines 1-4). In contrast, claim 4 requires a flow velocity of 30 m/s, which is not a conventional flow velocity as used in Haynes, but is at least one order of magnitude greater (50 to 500 feet per minute corresponds to 0.25 to 2.5 m/s).

The Examiner suggests that in Haynes the "velocity at the exit must be greater than conventional velocity prior to the perforated plates or screens in order to be at conventional velocity after being evenly distributed by perforated plates or screens." Office action, page 10 bridging to page 11. However, Haynes does not suggest that conventional velocity is obtained only after being distributed by perforated plates, but rather that the quench air generally is at conventional velocity. Moreover, even if conventional velocity occurs after distribution by the conventional apparatus, this does not mean that flow was necessarily higher than conventional velocity prior to the distribution. Indeed, given Haynes' repeated statements that the gas flow is a conventional velocity, it is probable that the flow would vary within the conventional range prior to and following distribution by a conventional apparatus. Haynes certainly contains no teaching or suggestion to use a flow velocity of 30 m/s according to claim 4.

The Office action further fails to provide any reason why one of skill in the art would modify the teachings of WO '768 and Haynes to provide claim 4's velocity, which, as noted above, is over one order of magnitude higher than the maximum velocity suggested by Haynes. The Office action's assertion that "routine optimization" would lead one of skill in the art to the claimed velocity is without rational basis or reasoning in view of the explicit teachings of Haynes. These teachings include a focus on cooling gas streams of <u>conventional flow velocity</u> and emphasis of the advantage that no increased flow velocity is required. For example, Haynes indicates that "[i]n order for turbulence to occur, <u>the quench gas need only be supplied at a conventional flow rate and velocity</u>. The bar arrangement causes turbulence <u>without requiring increased flow velocity</u>, thereby minimizing disturbance or breakage of the filaments being quenched." (col. 2, lines 13-19) (emphasis added).

Furthermore, the present application describes the advantages of the presently claimed invention "[s]urprisingly, it has now been found that, in the case of a cooling gas stream exiting in a turbulent state and at a high velocity from the blowing device and having the same cooling capacity as a laminar cooling gas stream, considerably smaller amounts of blowing air seem to be needed than has been initially assumed. Due to the reduced amount of blowing gas, which is preferably achieved by virtue of small cross-sections of the gas stream, the surface friction on the

continuously molded bodies can be kept small despite a turbulent blowing, so that the spinning process is not negatively affected." Page 6, second paragraph. These advantages are not taught or suggested in the art.

Fifth, amended claim 4 recites that the cooling gas stream has a Reynolds (Re) of at least 2,500 based on its width (B), measured substantially in the direction of passage of the continuously molded bodies through the air gap, and on its velocity in the direction of flow, and the viscosity (v) of the cooling flow medium, and the extrusion orifices have a temperature of up to 102°C.

Hence, in addition to the velocity of 30 m/s discussed above, claim 4 further recites that the cooling gas stream has a Reynolds (Re) of at least 2,500 and that the extrusion orifices have a temperature of up to 102°C.

A skilled person would expect that a cooling gas stream with such a high velocity would blow off the extruded bodies, which would subsequently stick together. The inventors discovered that to avoid the bodies being blown off, a Reynolds' number of at least 2,500 was could be used, resulting in a cooling gas steam with a turbulent flow state. This cooling gas stream with a turbulent flow state was found, in contrast to gas stream with a laminar flow state, not blow off the bodies, even if the gas flows at a high velocity. Rather, the gas was found to circulate around each extruded body, not forcing it into one single direction. Consequently, the extruded bodies are not brought in contact with each other and cannot stick together.

Applicants respectfully submit that the combination of high velocity and turbulence would not have been obvious to one of skill in the art, as one of skill in the art would reasonably expect this combination to be detrimental to the extruded bodies. As set forth in the specification, and noted above "one would have expected in the case of a blowing process performed with a turbulent cooling gas stream at a high velocity that due to the high velocities the spun filaments would be blown off and would thus stick together. Surprisingly, however, it has been found that the spun filaments are not impaired" Page 6, last paragraph.

Furthermore, the inventors found that maintaining the recited temperature at the extrusion orifices maintained a relatively high viscosity of the extruded bodies. Extruded bodies with the high viscosity were more rigid and were more resistant to being blown off. Neither reference, taken alone or in combination with each other, teaches or suggests this element, such that a *prima facie* case of obviousness has not been established for claim 4.

In view of the foregoing, allowance of claim 1 is respectfully requested.

Dependent claims 3-21 and 24-26

Each of claims 3-21 and 24-26 depend either directly or ultimately from allowable claims 1 or 4, and accordingly, claims 3-21 and 24-26 are allowable for at least the reasons set forth above for claims 1 and 4. Dependent claims 3-21 and 24-26 may contain additional patentable subject matter for reasons not set forth herein.

Obviousness-Type Double Patenting

Claims 1 and 3-26 are rejected for nonstatutory obviousness-type double patenting over co-pending U.S. Application No. 10/500,998 (now U.S. Patent No. 7,364,681) in view of Haynes. Claims 22-23 are canceled without prejudice. Applicants respectfully traverse the rejection.

Haynes is not pertinent to claimed invention for the same and similar reasons set forth above for claims 1 and 4. Accordingly, Applicants request withdrawal of the double-patenting rejection.

Claims 3-21 and 24-26 depend from claims 1 or 4 and are allowable for at least the reasons set forth above for claims 1 and 4. Withdrawal of the provisional obviousness-type double-patenting rejection is respectfully requested.

CONCLUSION

In light of the foregoing, Applicants respectfully request withdrawal of the rejections and allowance of the application. Should any questions remain, the Examiner is encouraged to contact the undersigned at the number below.

Respectfully submitted,

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